



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.      | CONFIRMATION NO.       |
|---|-------------|----------------------|--------------------------|------------------------|
| 10/765,881  | 01/29/2004  | Toshiyuki Suzuki     | 2635-200                 | 2291                   |
| 23117 7590 10/01/2007<br>NIXON & VANDERHYE, PC<br>901 NORTH GLEBE ROAD, 11TH FLOOR<br>ARLINGTON, VA 22203 |             |                      | EXAMINER<br>OLSEN, KAJ K |                        |
|   |             |                      | ART UNIT<br>1753         | PAPER NUMBER           |
|   |             |                      | MAIL DATE<br>10/01/2007  | DELIVERY MODE<br>PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/765,881 | <b>Applicant(s)</b><br>SUZUKI ET AL. |  |
|                              | <b>Examiner</b><br>Kaj K. Olsen      | <b>Art Unit</b><br>1753              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-74 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-74 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>1-29-04;12-09-04</u> | 6) <input type="checkbox"/> Other: ____  |

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities: On p. 25, l. 4, the word "wining" is apparently a typo. However, it is unclear what word was meant to be there.
2. On p. 31, l. 20, the "34" should be --46--.

Appropriate correction is required.

### ***Claim Objections***

3. Claim 20 appears to be identical to claim 19. It appears that claim 20 should have depended from claim 2 and not claim 1. For the purpose of examination, the examiner has treated claim 20 as if it depended from claim 2.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

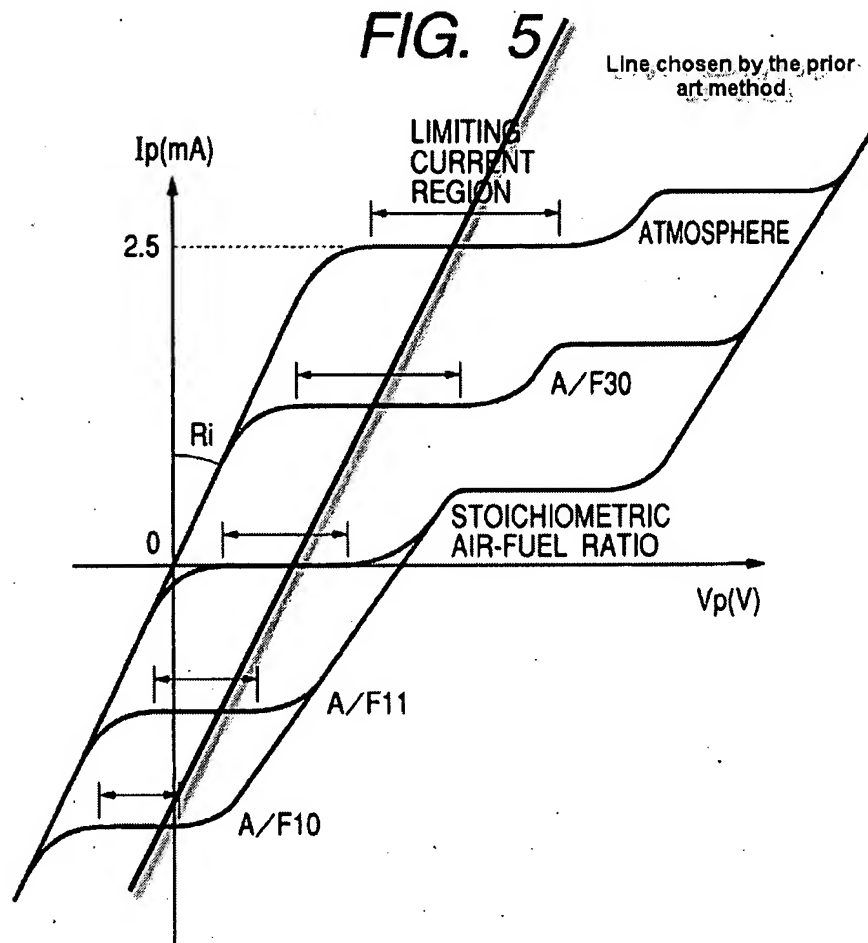
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-67, 69, and 71-74 are rejected under 35 U.S.C. 102(b) as being anticipated by Okazaki et al (USP 5,993,641).
6. With respect to claim 1, Okazaki discloses a gas concentration detecting apparatus for use in a limit-current type gas concentration sensor comprising a sensor element 12 including a solid

Art Unit: 1753

electrolyte 34 and a pair of electrodes (36, 37) placed on said solid electrolyte so that an element current flows in corresponding relation to a specific component whenever a voltage is applied to the sensor element. See fig. 2 and col. 4, ll. 43-65. With respect to the voltage being controlled on the basis of an applied voltage characteristic as defined by claim 1, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, see the discussion below.

7. With respect to claim 2 (those limitations not covered above), Okazaki discloses an applied voltage control unit connected to said electrodes of the sensor element for controlling the applied voltage on the basis of an applied voltage characteristic defined linearly (see fig. 8, 10, or 11 and col. 12, l. 63 through col. 13, l. 9 as an example), and an element current detecting unit 50 connected to said electrodes for detecting an element current (col. 5, l. 61 through col. 6, l. 6). With respect to said applied voltage characteristic being set on a basis of a width of a limiting current region, it is noted that this limitation does not appear to further define any structure of the invention. Rather this limitation merely sets forth the process for how the characteristic line is chosen and the process utilized to choose the line doesn't further define the actual structure of the applied voltage control unit. In the absence of any specifically defined trait for the chosen characteristic line that is not disclosed nor rendered by the prior art, this limitation cannot be considered to further define the structure of the apparatus itself. The examiner notes that a characteristic line that is parallel to the slope defined by  $R_i$  in fig. 5 (i.e. a characteristic line chosen by the prior art means) would appear to extend through all of the limiting current regions of the instant invention. See the modified instant invention figure 5 below:



Whether or not this line here was chosen by the prior art method or on the basis of the applicant's knowledge that the limit current region is narrower in the rich A/F ratio regions doesn't change the structure of chosen characteristic line. The instant inventors could have arrive at the above line "on the basis of a width of a limiting current region" (i.e. the line could have been chosen such that it went through all the limit current regions for the sensor), but it would have had the same structure as the line chosen by the prior art method. Moreover, even if

Art Unit: 1753

the examiner were to interpret the limitation “on the basis of a width of a limiting current region on each concentration level” as implying some structure significance, the use of characteristic lines in general are inherently set based on the widths of a limiting current regions. In particular, the whole purpose of characteristic lines is to alter the voltage applied such that the sensor is always in a limit current region. See col. 1, ll. 33-43. If the line is chosen such that one is in a limit current region, then one has chosen that line on a basis of a width of the limit current region because the widths define where that limit current region is. See fig. 8 and 11 of Okazaki where the line slope is repeatedly changed in order to maintain the voltage at a point safely between the widths of each limit current region. This line is clearly chosen based on knowledge of the widths of the limiting current regions.

8. With respect to claims 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 51, 59, and 67, because claim 1 never defined any structure drawn to the applied voltage characteristic, these various claims only further recite the intended use of the intended use of the apparatus of claim 1. However, see the discussion below for analogous claims.

9. With respect to claims 4, 6, 8, 10, 12, 14, 16, 22, 24, 26, and 28, these claims merely further define how the applied voltage line is to be chosen. As discussed above, the process utilized to determine the applied voltage line doesn't further define the applied voltage line utilized if the actual line chosen by the process isn't explicitly defined as being different.

10. With respect to claim 18, fig. 8 and 11 show the use of line segments for the applied voltage line (e.g. sections F and D in fig. 8 and L10 in fig. 11) that have I/V inclinations smaller than the resistance governing region determined by the DC internal resistance  $R_i$ .

Art Unit: 1753

11. With respect to claim 20, Okazaki doesn't disclose that the widths of the limiting current regions ever differ (see fig. 3 and 10 as examples). In the absence of different widths for the limiting current regions, it is unnecessary for the prior art to utilize different applied voltages. Alternatively, because Okazaki utilizes different applied voltage characteristics for each of the various regions (see fig. 8 where rich region B gets a different slope line than lean regions D or F) and because the instant invention teaches that the rich region has a different width of limiting current region, then Okazaki characteristic line of fig. 8 meets this claim limitation because Okazaki utilizes a different characteristics for rich and lean gases.

12. With respect to claims 30, 32, and 34, see fig. 11 and col. 14, ll. 44-63.

13. With respect to claim 36, fig. 6 and 7 represent a feedback routine for controlling the applied voltage on the basis of a set applied voltage characteristic.

14. With respect to claim 38, Okazaki teaches a voltage change regulating means in two forms. One, fig. 9 shows that the voltage change speed is regulated to set  $\Delta V/\Delta t$  values. Two, Okazaki discloses a low pass filter 22 which is a voltage regulation means because it filters out any high frequency change to the voltage source.

15. With respect to claim 39 (those limitations not discussed above), this claim is much like claim 1 where no actual structure is defined about the applied voltage characteristic. Applying the voltage in the set forth manner constitutes only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, see the discussion of claim 40 below as well.

16. With respect to claim 40 (those limitations not discussed above), this claim defines an applied voltage characteristic set on the basis of an intermediate inclination between a high-

Art Unit: 1753

voltage and low-voltage inclination. Similarly to claim 2 above, this limitation doesn't appear to further define the structure of the invention because the method that is utilized for determining this line doesn't further define the line itself unless the applicant explicitly defines the structure in a manner that is not anticipated nor rendered obvious over the prior art. Relying on the modified figure 5 above again, whether or not the line added by the examiner was determined by the prior art method or on the basis of some intermediate inclination doesn't change the actual structure of the line itself. Only the method utilized to determine the line was different.

17. With respect to claims 41, 43, 53, 61, and 69, because claim 39 never defined any structure drawn to the applied voltage characteristic, these various claims only further recite the intended use of the intended use of the apparatus of claim 39. However, see the discussion below for analogous claims either above or below.

18. With respect to claims 42 and 44, see the discussion for claims 10 and 12 above.

19. With respect to claim 45, see the discussion of claims 1 and 9 above.

20. With respect to claim 46, this claim is similar to claims 1 and 39 above where the claim language drawn to the applied voltage characteristic is merely setting forth the intended use of gas concentration detecting apparatus. Hence, claim 46 is anticipated for the same reasons that claims 1 and 39 were also anticipated above. Furthermore, even if the examiner were to give this claim language drawn to the applied voltage characteristic further due consideration, Okazaki teaches that the voltage applied to the electrodes is not to exceed 0.7 or 1.5 V (see fig. 8 and 11 and col. 14, ll. 44-63), which is before the decomposition voltage for water. Hence a voltage range where water is decomposed is excluded.

Art Unit: 1753

21. With respect to claim 47, this claim is similar to claims 1 and 39 above where the claim language drawn to the applied voltage characteristic is merely setting forth the intended use of gas concentration detecting apparatus. Hence, claim 47 is anticipated for the same reasons that claims 1 and 39 were also anticipated above. Furthermore, even if the examiner were to give the claim language drawn to the applied voltage characteristic further due consideration, the applied voltage characteristic shown in fig. 10 of Okazaki would overlap the limit current regions at a number of different temperatures. For example, at temperatures slightly above and below the temperature represented by fig. 10, the curve La would still be within the widths of each of the limit current regions.

22. With respect to claim 48, see the discussion for either claim 23 or 24 above.

23. With respect to claims 49 and 50, claim 49 is similar to claims 1 and 39 above where the claim language drawn to the applied voltage characteristic is merely setting forth the intended use of gas concentration detecting apparatus. Hence, claims 49 and 50 are anticipated for the same reasons that claims 1 and 39 were also anticipated above. Furthermore, even if the examiner were to give the claim language drawn to the applied voltage characteristic further due consideration, as the examiner discussed for claims 2 and 40 above, whatever criteria one utilized for choosing the applied voltage characteristic doesn't further define the characteristic in a manner that reads free of the characteristics of the prior art.

24. With respect to claims 52, 54, 60, and 62, see Okazaki, col. 8, ll. 36-41.

25. With respect to claims 55-58, 63-66, and 71-74, because claims 45-47 and 49 never defined any structure drawn to the applied voltage characteristic, these various claims only

Art Unit: 1753

further recite the intended use of the intended use of the apparatus of claim 39. However for claims 55-58 and 63-66, see Okazaki, col. 8, ll. 36-41.

***Claim Rejections - 35 USC § 103***

26. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

27. Claims 68 and 70 (and claims 67, 69, and 71-74 in the alternative) are rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki in view of Suzuki et al (USP 4,664,773).

28. With respect to claims 68 and 70, Okazaki set forth all the limitations of the claims, but did not explicitly recite the presence of a rich side limit to the air-fuel ratio range set at 11 or less. Okazaki sets the limit at 11.5 but doesn't specify any criticality for the choice of that ratio. Suzuki teaches that limit current sensors can be utilized all the way down to a  $\lambda$  of 0.5 (A/F of about 7.3). See fig. 5. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Suzuki for the apparatus of Okazaki so as to extend the utility of the sensor down to even A/F ratio detection range down to even richer exhaust gasses.

29. With respect to claims 67, 69, and 71-74, even if these claims were deemed to further define the structure of claims 1, 39, 45-47 and 49, they would be obvious over the further teaching of Suzuki as discussed above.

Art Unit: 1753


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753  
September 25, 2007

  
KAJ K. OLSEN  
PRIMARY EXAMINER